UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/625,711	07/22/2003	Patrick Noll	COS-933	8121

25264 7590 04/12/2006

FINA TECHNOLOGY INC
PO BOX 674412
HOUSTON, TX 77267-4412

EXAMINER	
TESKIN, FRED M	

ART UNIT	PAPER NUMBER
1713	

DATE MAILED: 04/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/625,711	NOLL, PATRICK	
	Examiner	Art Unit	
	Fred M. Teskin	1713	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-5,7,9,10 and 12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *3 and 4* is/are allowed.

6)☒ Claim(s) *5,7,9,10 and 12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

The Reply of January 15, 2006 having been entered, claims 3-5, 7, 9, 10 and 12 are currently pending and under examination.

Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 10 is ambiguous due to broad and narrow statements of the loop reactor product: the preamble refers to a "polymer" loop reactor while the body of the claim calls for producing "polyethylene a polymer" using a slurry loop reactor. Clarification and appropriate correction are required.

The previously indicated allowability of claims 5, 7, 9 and 10 is withdrawn in view of the newly discovered prior art to Demoro et al and Keeler et al. Rejections based on the new references follow.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 7, 9, 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6718234 to Demoro et al.

Demoro et al teach a system for the on-line inference and control of physical and chemical properties of polypropylene and its copolymers produced in loop reactors. The provided definition of "loop reactor" (col. 4, ll. 16-19) makes clear that a slurry-type tubular reactor is contemplated. Further, in the disclosed system the preferred modeling technique is said to comprise the use of neural networks (col. 1, ll. 61+ and col. 3, ll. 31+) and on-line inference of desired properties (chemical and physical) is calculated using mathematical models (col. 3, ll. 5+). As more specifically shown in Figures 5 and 6 and detailed in column 14, lines 6 *et seq.*, desired values of controlled variables including product properties (e.g., IV) and reactor characteristics (e.g., split and pressure) are inputted to a non-linear predictive control model based on neural network, which solves a problem of non-linear optimization to determine the values of the manipulated variables so that the controlled variables are maintained close to the desired values. As tabulated in Figure 6, the manipulated variables include numerous specific process parameters. As such, Demoro et al is considered to teach the concept of controlling a polypropylene production process by using a neural network model-based controller to infer – i.e., predict (see col. 6, ll. 40-43) - a plurality of process control parameters based on desired product properties and reactor characteristics, and control the process using the predicted process control parameters.

While Demoro et al lack a specific teaching of applying their on-line control system to a process for producing polyethylene using a slurry loop reactor, the patentees' process is characterized as specifically directed to polypropylene

homopolymer, copolymer and terpolymer, with ethylene being identified as one of but eleven enumerated comonomers (col. 4, ll. 30+).

In light of this teaching, it would have been obvious to one of ordinary skill in the art to apply the control system of Demoro et al to the production of propylene/ethylene copolymer, motivated by the expectation of obtaining copolymer resin having recognized commercially valuable properties. In this regard, the claim term "polyethylene", in the absence of a specific definition herein to the contrary, is taken in the broadest reasonable context to include polyethylene homo- and co-polymers. As so construed, the rejected claims do not preclude the production of propylene/ethylene copolymer as suggested by the teachings of Demoro et al.

Concerning claim 9, the use of a controller programmed with an algorithm would have been obvious to one of ordinary skill given the teachings of Demoro et al, particularly the described use of a multivariable non-linear constrained model predictive *control algorithm* for on-line control of a polymerization plant (col. 16, claim 1).

Concerning claim 12, the mathematical model of Demoro et al is not expressly taught to have a variability decreased by 70 % in comparison to a conventional PID controller. Nevertheless, both the patentees and the applicants' preferred model involve neural inputs and outputs to be used by the control system, with the patentees' controller being taught to afford a benefit in decreased variability in process variables (col. 15, ll. 46+). In particular, Figure 8 is said to indicate a reduction in the variability observed in the melt flow index of polymer produced in a first loop reactor that is equivalent to an 80 % decrease in error variance (cols. 15-16, bridging paragraph).

Given the identity of modeling technique and the indicated reduction in error variance, a plausible basis exits for concluding that the patentees' neural network based control model intrinsically provides the claimed decrease in variability, relative to a conventional PID controller.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Demoro et al, in view of US 6243696 to Keeler et al.

Demoro et al is applied as in the preceding rejection. Demoro et al, though failing to teach incorporation of a mathematical model into a computer spreadsheet as claimed, do provide for the use of neural networks in a preferred modeling technique for inference and control systems for on-line control of the production rate of polypropylene and its copolymers with comonomers such as ethylene. The modeling technique involves the inputting of desired and inferred values for controlled variables into a non-linear predictive controller based on neural network (Demoro, Fig. 5).

Keeler et al relate to the construction of a run time prediction system for generating predicted values representing the operating parameters of a plant during operation thereof (col. 2, ll. 35+). Like Demoro et al (*cf.*, col. 13, ll. 25+), the Keeler et al system comprises a distributed control system operable to generate various system measurements and control settings representing system variables (e.g. temperature, flowrates; see col. 5, ll. 11+) that comprise the input data to a system model. Also like Demoro et al (*cf.*, col. 3, ll. 5+), Keeler et al provide for the use of neural networks trained using a historical database (col. 25, ll. 15+). In this latter regard, Keeler et al

teach that a non-linear predictive model may be created by providing a system that only requires a set of inputs be entered into a spreadsheet and then processed through a neural network. (Keeler, col. 26, ll. 45+ and Fig. 35.)

Inasmuch as both references relate to the field of process operation control, one of ordinary skill would have been expected to look to Keeler et al for guidance in implementing the control system of Demoro et al. In so doing, one would have been led to incorporate the control matrix of Demoro et al (see col. 14, ll. 19+) into a spreadsheet as taught by Keeler et al, so as to facilitate data input into the neural network based controller of the former. Further, one of ordinary skill would have been motivated to apply the control system of Demoro et al to the on line control of a process for producing species of "polyethylene", *viz.*, propylene/ethylene copolymer, using a slurry loop reactor based on the rationale given in the preceding rejection. Accordingly, it is held that the applicants' process as defined in claim 5 would have been *prima facie* obvious to one having ordinary skill in the art at the time of invention.

The previously indicated allowability of claims 3 and 4 is maintained.

In view of the new grounds of rejection not necessitated by amendment, this action is made non-final.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner F. M. Teskin whose telephone number is

(571) 272-1116. The examiner can normally be reached on Monday through Thursday from 7:00 AM - 4:30 PM, and can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The appropriate fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FMTeskin/04-10-06

FRED TESKIN
PRIMARY EXAMINER
1713